Diving Behavior of Sowerby's Beaked Whale in the Azores

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LONG-TERM GOALS

The goal of this effort is to investigate the behavior of Sowerby's beaked whale (*Mesoplodon bidens*).

OBJECTIVES

The scientific objectives of this effort are to study the natural diving behavior of Sowerby's beaked whale at the Azores and relate their diving behavior to published records of the natural diving behavior of other species of beaked whales in the framework of the sensitivity of beaked whales to sonar exposure.

APPROACH

Beaked whales are notoriously difficult to study, and research on their behavior to a large extent depends on sea state conditions, densities and success to (re)localize animals. During the ONR-funded BRS-study Azores-Baseline 2011 (studying social behavior of Risso's dolphin, Northern bottlenose whale and short-finned pilot whale), shore-based observations showed regular occurrence of Sowerby's beaked whales off Terceira Island, Azores. It was found that this area has optimal conditions to study Sowerby's beaked whales: during summer months, high sighting rates in the area are combined with good sighting conditions and the ability to track focal groups from shore.

The project was conducted in cooperation with the Azores Baseline-2012 BRS study (Visser 2012), to benefit from a prolonged research period with focus on Sowerby's beaked whales during days with excellent sea state conditions. Shore- and vessel-based field effort was conducted off Terceira Island, Azores in July/Aug 2012. Shore-based effort from a fixed look-out consisted of surveys, focal follows and guidance of the research vessel to target species' groups. Follows of focal groups consisted of recording social behaviour (Visser et al. 2011) and geographical location. Location was determined with high accuracy using a calibrated theodolite. Vessel-based effort consisted of surveys, focal follows, tagging effort (DTAG3), acoustic recordings (towed hydrophone array) and photo-identification. Monitoring of the track, group composition and social behavior was conducted from first to last sighting for all focal groups from both platforms.

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The research set-up strongly benefited from the combination of shore- and vessel-based effort. During days with excellent sea-state conditions (Bft <2), observers scanned the research area from the shore-based look-out. Following a sighting, the shore-based team started tracking the focal group and guided the research vessel to the group for tagging (e.g. Fig. 1). This resulted in repeated fast responses and good vessel placements, and therefore good tagging opportunities.

Key individuals
Peter Tyack (SMRU) and Ricardo Antunes (SMRU) were main Scientific Advisors and DTAG specialists of the current project.

WORK COMPLETED

- Shore- and vessel-based field effort: July/August 2012
- Sowerby's beaked whales were present in high abundance in the research area
- Baseline behavior data collection of Sowerby's beaked whale
- Tagging effort and tag attachment on Sowerby's beaked whale: 6 groups targeted for tagging
- First documented tag attachment on Sowerby's beaked whale (Fig. 3)
- Field methods, combined shore- and vessel based effort, were successful and optimized opportunities for observing, tracking and tagging Sowerby's beaked whales (Fig. 1)
- Successful operational strategy: target beaked whales during perfect conditions over a prolonged research period
- High quality shore-based tracking: first insight into movement and distribution patterns of Sowerby's beaked whale in the Azores
- Photo-identification: set-up of photo-identification catalogue of Sowerby's beaked whale in the Azores (Fig. 2)

Figure 1. Left: Sowerby's beaked whale focal group off Terceira; Right: Close-up of rostrum, showing absence of teeth in the lower jaw.

RESULTS

High sighting rates and first tag deployment for Sowerby's beaked whale
High sighting rates observed in the research area during 2011 were confirmed in the current project: Sowerby's beaked whales were seen on all days with calm seas, resulting in 46 distinct sightings on 12 different days during 30 days of observations in July/August (7 days with excellent sighting

conditions; Fig. 1). The species was present within 9 km from land, at depths ranging from 450-1500 m. Photo-identification effort indicated regular presence of females and subadults and resulted in the set-up of an ID catalogue for Sowerby's off Terceira (Fig. 2). Cooperation between shore- and vessel-based research teams enabled tracking of 8 Sowerby groups and resulted in the first documented tag attachment on a Sowerby's beaked whale (Fig. 3).

Strong benefit shore-based effort

Sighting and data collection at sea strongly benefited from the shore-based effort. The majority of sightings were first seen from land. Following a sighting, the shore-based team focussed on tracking the focal group and guiding the research vessel to the location of the sighting. The majority of shore-based sightings were recorded on the theodolite, resulting in highly accurate positioning data for a larger number of sightings than would have been achievable from a vessel-based platform alone.

Tagging effort

In total 6 groups of Sowerby's beaked whales could be targeted for tagging. Tagging effort was successful in the approach of the first group, resulting in the first tag deployed on a Sowerby's beaked whale (Fig. 3). Unfortunately, the tagged whale responded with such a strong acceleration that the tag came off within a minute after deployment. While not resulting in a tag attachment, multiple tagging attempts (approaches <15 m) were made during 4 out of 5 remaining tagging approaches. The close cooperation between the shore- and vessel-based team resulted in the potential for repeated fast responses and good vessel placements, and therefore good tagging opportunities, during tagging of the Sowerby groups. In combination with regular sightings, this also allowed for a rapid build up of experience of working with this new species.

Cooperation with Azores-Baseline Project

The cooperation with the Azores-Baseline project allowed for an extended research period with a focus on Sowerby's beaked whales during days with the best sighting conditions and for use of established shore- and vessel-based logistics, equipment and field experience. This greatly benefited the current project, resulting in a highly successful pilot project during which effective research methodology was established, and a high quality and relatively large data set was obtained for a poorly researched and elusive species of beaked whales. Continued research, obtaining dive patterns from tag data, is critical to understand Sowerby's beaked whale dive behavior.

Figure 2. Five individuals identified by photo-identification off Terceira, Azores

Figure 3. Left – Tagging attempt. Right – First recorded tag attachment on Sowerby's beaked whale.

IMPACT/APPLICATIONS

Due to their cryptic behavior, the beaked whale family (Ziphiidae) remains one of the least known mammal groups worldwide. However, over the last decade, highly advanced tagging technology (Johnson & Tyack 2003) has greatly advanced our knowledge on a number of beaked whale species. This research has been strongly motivated by the over-representation of beaked whales in sonar-related strandings (e.g. D'Amico et al. 2009). The stranding of beaked whales after sonar exposure is most likely started by an avoidance response, which may also result in an alteration of their dive pattern (Cox et al. 2006, Tyack et al. 2006, Tyack et al. 2011). Thus far, the behavior and ecology of Sowerby's beaked whale, including dive patterns, remain largely unknown. Stomach contents of specimens stranded at the Azores revealed a diet composed predominantly of small, midwater fish inhabiting water depths of 0 - 750 m (Pereira et al. 2011). This contrasts with the deep sea cephalopod-dominated diets of all beaked whale species studied thus far (e.g. Pauly et al. 2008) and may indicate alternative diving patterns and strategies for this species, compared to the other beaked whales. In turn, this may have implications for the vulnerability of Sowerby's beaked whale to sonar exposure.

RELATED PROJECTS

Cetacean social behavioral response to sonar: Cooperation in tagging and tracking effort of target species in the Azores, Azores-Baseline field effort. ONR Award number: N000141110298

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